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V. *Experiments concerning the Effects of Air pass'd through red hot Mettals, &c. By Mr F. Hauksbee, F. R. S.*

IN order to find what Effect such a *Medium*, as Air pass'd thro' red hot Mettals, might have on the Lives of Animals, I contriv'd the following Method. I took a large Receiver open at top, in Diameter about 4 Inches, which was covered with a Brass Plate and wet Leather, as usual in Glasses of such a make. To this Plate at top (which had a Screw with a small Perforation) belonged a Cock, and from that Cock proceeded a small hollow Wire, about 3 feet in length: That End of this hollow Wire, which was remote from the Receiver, was put into a hollow Piece of Cast Brass, pretty thick in substance, but the Hole was not quite through: And the Hole being larger than the small hollow Wire, it was wedg'd into the same with Pieces of Steel Wire, till the Cast Brass was fill'd as full as it could contain. In this manner it was put into a Charcoal Fire, and there it lay till it was thoroughly red hot. The Receiver being then exhausted of its Air, the Cock on the upper part of it was turn'd, which gave liberty for that Air only, which of necessity must pass thro' the red hot Mettals, to succeed. This Air first passing down thro' the small Ducts between the red hot Wires, before it could come to enter the red hot hollow Brass Wire, must of necessity suffer or undergo such a Change, as Fire or the Fumes of such red hot Mettals would give it. When the Receiver was fill'd with this Air, and had stood some little time, the Brass Cover was taken off, and

a pretty large Cat immediately plung'd into it : The Cover being laid on again, the Cat immediately fell into Convulsions, and in less than a Minute appeared without any sign of Life. Then being taken out of the Receiver and laid on the Floor, she continued as Dead ; but in less than a Minute of time she began to discover Life by motion in her Eyes; and after 2 or 3 hideous Squalls, she began to recover apace ; but was very fierce, and did spit and fly (as well as her Weakness would suffer her) at any one that offer'd to touch her ; and it seem'd hazardous for any one then to attempt it. But after half an hours time, or thereabouts, as her Strength and Ease recovered, so her former Temper encreased upon her, suffering herself to be handled without any sign of fierceness, as before.

As to the Effect, which the same sort of Factitious Air has upon Flame, take as follows.

I no sooner came to plunge a lighted Candle into it, but it was immediately extinguish'd : And this I several times observ'd, that when the Candle was slowly immers'd, so much of the Wick (which before was lighted) as came but within the verge of the Glafs, died ; and so the rest successively, as it descended to the same place : And this upon several repetitions, answer'd much the same. But in some time, as the common Air came to mix with it, one might plunge the lighted Candle lower and lower, before it did go out, till at last it would remain burning at bottom.

As to the Elasticity and Specifick Gravity of the fore-mention'd *Medium*, I have made several tryals, (and I think very accurate,) but find it no ways differing from Common Air, in respect to those Properties.

Hence it follows,

That the foregoing Effect, is no ways assisted from any Imperfection or defect in the last mentioned Properties:
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Therefore the following Queries seem to offer themselves

Query 1. Whether Air itself may so suffer in its own Nature, by any sort of Fire, as to be divested of the Power of subsisting Life or Flame: Or,

Query 2. Whether the *Effluvia*, or Steems, proceeding from the red hot Mettals, which the Air may take along with it in its Passage near them, do not very much contribute, if not wholly occasion the Effect.

If the latter takes place, I presume it may in some measure be applied to account for the Effect, that the Damps, or Steems, which arise from Subterraneous Caverns, impregnated with Metalline *Effluvia*, have on the Lives of Animals: And yet at the same time, the same Air way suffer no Change in respect to its other Properties, I mean its Elasticity and Specifick Gravity, in comparison with other Air in the same Region.

Experiments concerning the Effect of Air pass'd thro' a Degree of Heat, equal to that of boiling Water.

I Contriv'd a Brass Box, about 4 Inches long, and an Inch and half over: At one end, which I solder'd up I fix'd two small Brass Tubes; one of which went thro', and reach'd the Remoter end nearly; the other Tube was but just inserted in it, but each of them long enough to reach sufficiently above the Surface of the Water in which they were to be put. These Tubes were to convey the Air into a Receiver exhausted of its Air: It pass'd first into that Tube which nearly reach'd its opposite end, and so into the other which lead to the exhausted Receiver. But the Box, with that part of
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the Tube that was within it, was first pressed full of Brass Dust ; which I had the conveniency to do by means of a Brass Cap, which screw'd on to the end, not before mentioned. This Brass Dust I moistned with a little Water, thinking thereby to exert a more than ordinary Steam, or *Effluvia*, from the Mettal, which the Air might take along with it, as it pass'd through such strait and narrow Avenues, as it must do between the Brass Dust. In this manner it was put into the Water when Cold, and continued in it till it had boil'd a considerable time ; by which means it must, in all its Parts, be of the same Degree of Heat (at least) as the boiling Water. Thus it was taken out, and applied to the exhausted Receiver ; where, upon turning a Cock, I gave the liberty for that Air only to pass into it, which must succeed through the Brass Box and Dust, under the Circumstances before mentioned. When the Receiver was full of this Air, the Cover was taken off, and a lighted Candle plung'd into it, where it continued burning, even at the bottom, as if it had pass'd through no such *Medium*, but had been full of Common Air. I took that Method to try it, believing the Flame of a Candle to be the most tender way of discovering a Change in Air. Afterwards I repeated the same Experiment over again, with dry Brass Dust instead of the former ; but the Success was the same. Therefore it seems to me, that such a Degree of Heat, as that of boiling Water, is not sufficient to cause any considerable Change (if any at all) in the Air ; nor such a Degree of Heat, able to strike any Injurious, or suffocating *Effluvia*, out of the Metalline Particles.

Some other Experiments on the foregoing Head.

THE passing of Air through a red hot Glass Tube into an exhausted Receiver, had no manner of influence on a Sparrow put into the same: But upon passing of Air through red hot Charcoal, before it enter'd the Tube that convey'd it into the exhausted Receiver, the fore-mentioned Animal, in that *Medium* in about a quarter of a Minute, gave signs of presently expiring; but being taken out at the same time did recover, and continued living and well for some Days after. Yet it was concluded, had the Birds continuance in the Receiver been but double that time, her recovery would have been very doubtful. I have likewise try'd Air pass'd through the Flames of Spirit of Wine, and Oil of Turpentine: The Effect was much the same as to the Spirit of Wine, the Flame of a Candle being immediately extinguish'd upon its being plung'd into it: But the Air which pass'd through the Flame of the Oil of Turpentine took some Unctious Fumes along with it into the exhausted Receiver; which Fumes, upon the near approach a lighted Candle, suddenly took fire, and continued to burn on the upper Surface, till they were stifled by covering close the Receiver: And upon several Repetitions it answer'd much the same, till the whole quantity of Fume was consum'd.